

# Monitoring Study Group Meeting Minutes

September 17, 2002

Howard Forest

The following people attended the MSG meeting: Tharon O'Dell (BOF-chair), John Munn (CDF), Dr. Jerry Ahlstrom (CDF), Peter Ribar (Campbell Timberland Management), Richard Gienger (HWC/SSRC), Joe Blum (NOAA Fisheries), Ross Johnson (CDF), Charlotte Ambrose (NOAA Fisheries), Roger Poff (RJ Poff and Associates), Dean Lucke (CDF), Curt Babcock (DFG), Robert Darby (PALCO), Dan Sendek (BOF), Adona White (NCRWQCB), Julie Bawcom (CGS), John Corbett (NCRWQCB), Bernie Bush (SRCO), Cajun James (SPI), Dr. Lee Benda (Lee Benda and Associates, Inc.), K. Kelly Finn (NMFS), Joe Croteau (DFG), Dr. Matt O'Connor (O'Connor Environmental), Dr. Morgan Hannaford (Shasta College), Clay Brandow (CDF), Stephen Levesque (Campbell Timberland Management), Mark Rentz (CFA), Dr. Richard Harris (UCCE), Charlie Martin (CDF), and Pete Cafferata (CDF). **[Note: Action items are bolded].**

We began the meeting with general monitoring related announcements:

- Richard Harris spoke briefly about the LWD recruitment modeling effort that he has been heading up. A general meeting was held in April and a second, smaller meeting took place in July. It was agreed that what is needed are consistent field methods at 2 levels: 1) research level, and 2) extensive survey level suitable for project level information—such as for a THP. Additionally, it was agreed that long-term monitoring sites are required. Gary Nakamura and Richard offered to take the next step—obtaining a series of protocols and field-testing them. Richard recorded who attending the present meeting was interested and willing to provide existing protocols. Additionally, he noted that a student named John Wooster, working with Dr. Tom Lisle at the Redwood Sciences Laboratory, has produced excellent papers on LWD in second growth and old-growth titled “*Compilation of Stream Cleaning Data in the North Coast, California*” and “*Large Woody Debris Volumes and Accumulation Rates in Cleaned Streams in Redwood Forests near the Confluence of South and Mainstem Eel River, California*” that are available [contact Richard Harris or Pete Cafferata for the electronic files]. Additionally, Lee Benda mentioned his recent publication (in press) titled “*Recruitment of wood to streams in old-growth and second-growth redwood forests, northern California, U.S.A.*” is available as a PDF file [contact Lee Benda or Pete Cafferata for the electronic file]. Also, Lee suggested that field methods used in California reflect a mass balance or wood budget approach, the topic of at least 4 recent papers (published and in press). In addition, a wood budget is the framework used in 6 wood studies (involving quantifying the processes and rates of wood recruitment, including source distance curves and wood transport) conducted in Northern California during the last 2 years: 1 in the Van Duzen watershed (PALCO watershed analysis), 3 in Northern Sierra foothills and in the Weaverville area (SPI), and 2 in the Mendocino area (Ten Mile watershed) for the Campbell Group. Others are planned.
- Richard Gienger stated that the Humboldt Watershed Council and other Humboldt County watershed groups are attempting to develop an adequate monitoring program for road decommissioning work, including removal of numerous watercourse crossings, in the Mattole River watershed. Landowners include the Sanctuary Forest and Pacific Watershed Associates completed the road and crossing inventory assessment work. The watershed groups are seeking sources of funding for this monitoring work.

The next agenda item was a combined presentation by Cajun James, Dr. Lee Benda, and Dr. Morgan Hannaford, on temperature, large woody debris/sediment, and macroinvertebrate data for the Southern Exposure research site located in the Antelope Creek watershed in Tehama County. Cajun began the

talk by providing some background information on the Southern Exposure site. This area was designated as an Experimental Area by the Board of Forestry and Fire Protection in October 2001. The objective of this study is to detect impacts on stream temperature, near-stream microclimate, canopy cover, water quality, and the response of aquatic organisms following clearcut harvesting of multiple units adjacent to a Class I watercourse. The experimental design for the site is illustrated in Figure 1. There are 7 blocks and 3 have been harvested (each harvested block is 30 acres). Winter base flow is 3 to 5 cfs and stream width is about 15 feet wide. Summer discharge drops to approximately 1.5 cfs. Slopes are relatively flat and the drainage area is about 12,000 acres. Parameters being measured include: water temperature, air temperature, relative humidity, soil temperature, wind speed, precipitation, turbidity, and soil moisture. Two YSI 6280 multi-parameter water quality Sonde devices are located within the 1.5-mile stream reach. One water quality station is located at the top of the first control block, C1 and the second is located at the top of the last control block, C4. Stream temperature and microclimate sensors have been continuously recording data since June 2000. Canopy has been measured with a Solar Pathfinder, spherical densiometer, and sighting tube. Additionally, hemispherical photography pre and post-harvest is being taken. LIDAR has been flown at a resolution of 0.8 m. All harvested units had watercourse protection buffer widths initially of 175 feet. These buffers of 175 feet were also thinned to 50% overstory and 50% understory canopy cover, the State of California minimum standard. Logging began in the first phase of harvesting in late July 2000 and was completed by August 23, 2000. Following documentation of environmental conditions, buffers were then reduced to 100 feet with the same 50% vertical canopy remaining post-harvest in October 2001. Within the 100-foot buffers, angular canopy density has been reduced from 95% to 85% over the channel, as measured with the Solar Pathfinder. Hyporheic effects on stream temperature have been investigated with fluorometer tests this past summer 2002. Red dye was introduced to the channel at a constant rate to determine stream flow and water mixing distance. Fluorometer testing found no difference in stream flow upstream to downstream. Stream flow was calculated to be 1.5 cfs along the entire experimental zone and complete water mixing was observed within 4 chains (264 feet).

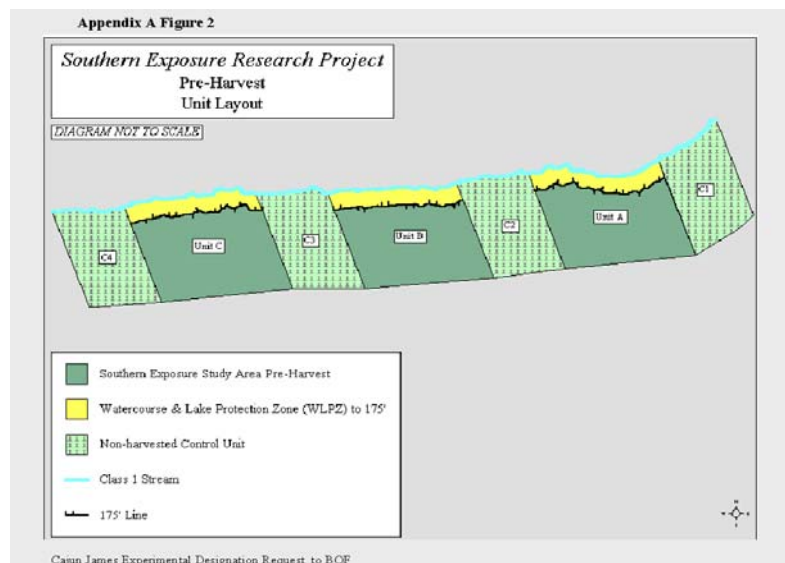


Figure 1. Experimental design for the Southern Exposure site. WLPZ widths were initially 175 feet, and then reduced to 100 feet. Next June WLPZ width will be reduced to 50 feet (figure used with permission from Cajun James, SPI).

Water temperature data shows that the Southern Exposure site has a daily fluctuation range of 8°C, going from 12.1 to 20°C in the summer months. Maximum temperatures each year reach 20 to 21°C

C. The factor best correlated to water temperature is air temperature, illustrating the importance of having meso-climate data. Over 3 years, no significant change in water temperature patterns have been observed due to the timber harvesting operations that have occurred to date. So far the predicted result from the Heat Source Model developed at Oregon State University has agreed with the measured data. As was observed at the Millseat Creek site, 50% vertical canopy approximately equals 85% angular canopy density. Next June, harvesting will resume; WLPZ widths will be reduced to 50 feet with continued documentation of impacts. Riparian zone microclimate data has shown a 1.0° C increase out from the channel, with differences disappearing after about 40 feet.

Cajun emphasized that this research project has been very expensive and labor intensive. She stressed that past work has often been retrospective in nature without sufficient background data to provide a “stream signature” for water temperature. Data management has been challenging, with over 20 GB of data collected thus far; Dr. Bruce Krumland has been instrumental in providing programming to make the data usable.

Lee Benda spoke about wood and sediment budgets he has constructed for the Southern Exposure site. Protocols for wood budgeting are similar to those used for sediment budgets and work has been underway on wood budgets since the mid-1990's. Six wood budgets will be completed by the end of this year. Data collected includes Large Woody Debris (LWD) length, diameter, recruitment process, age, species, etc. Data at Southern Exposure was collected above and below the 3 cut blocks, covering 7000 m along the channel. Results have shown significant spatial variability, with loading varying from a factor of 2 to 10. LWD input mechanisms are mainly bank erosion and mortality, with little to no input from landsliding. Channel inventory work has revealed that past logging has been responsible for 20% of existing LWD storage, bank erosion 40%, and mortality 40%. Regarding recruitment rates, mortality, bank erosion, and landsliding were responsible for 40%, 52%, and 8% respectively. Landsliding recruitment was isolated to Antelope Creek. High spatial variability was noted for dominant recruitment process. Source of input could only be determined for 25 to 35% of the LWD pieces inspected. Similarly, only about 25% of the pieces could be dated.

Lee compared Sierra/Cascade province LWD loading ( $\text{m}^3/100 \text{ m}$ ) to that found in North Coast watersheds. In general, Sierra/Cascade loading is lower by a factor of 5 to 15 times. Little Lost Man Creek, a reference old-growth redwood watershed located in Redwood National Park, has one of the highest loading documented, largely due to large tree size and significant landsliding input. In terms of recruitment distances at the Southern Exposure site, Lee has found that about 90% of the wood enters from the first 10 m due to the importance of bank erosion in this watershed as an input mechanism. Conifer trees are short here in this 80-year-old stand, averaging only 100 feet, compared to the coastal redwood forests

Lee presented a sediment budget for the Southern Exposure site, with erosion processes including soil creep, landslides, fires, etc. Natural factors were estimated to be: soil creep—33  $\text{t/km yr}^{-1}$ ; mass wasting—0  $\text{t/km yr}^{-1}$ ; and wildfire—28 to 410  $\text{t/km yr}^{-1}$ ; post-fire surface erosion was estimated using WEPP (USDA, USFS erosion model). Management related factors were estimated as follows: road surface erosion—7  $\text{t/km yr}^{-1}$  (using SEDMOD), and harvest unit surface erosion—3.4  $\text{t/km yr}^{-1}$  (using WEPP). SPI has initiated a field study of surface erosion from skid trails at the Southern Exposure study site: erosion from skid trails has not been documented for the first 1.5 years of measurement. The results have shown an increase in soil elevation, a counter-intuitive finding that occurred because of needle ice formation during winter; increased soil elevation persisted into the following summer. Increased soil elevation should decrease soil bulk density, increase soil porosity, and therefore, decrease the potential for exceeding soil infiltration by precipitation intensity and, hence, decrease the potential for surface erosion. Similarly, surface

erosion from harvest units has been very minimal. All three units were piled and burned in fall 2000.

Morgan Hannaford provided an introduction to biomonitoring and rapid bioassessment techniques currently in use in California. Morgan stated that the work he has conducted at the Southern Exposure site has been one of the few studies that has not been retrospective involving macroinvertebrate sampling. Advantages to macroinvertebrate sampling include: 1) they are located in most habitats, 2) many species offer a range of tolerance, 3) aquatic insects are easy to sample, and 4) identification is easy to the family level. Sensitive organisms include stoneflies, mayflies and caddisflies. At Millseat Creek, drift net sampling did not identify harvesting impacts. The EPT Index, Biotic Index, and functional group percentages calculated for Rapid Bioassessment samples from Millseat Creek did not indicate statistically significant changes associated with logging. At the Southern Exposure site, where data is still being collected, Morgan hopes to increase the replicates 3 fold for more powerful statistical analysis using a “before-after-control-impact” (BACI) design.

**Cajun closed the combined presentation by stating that the Southern Exposure data is available, but if the data is used, to please contact her first for permission.**

Following lunch, we continued our discussion on cooperative THP-scale instream effectiveness monitoring projects. CDF has offered to participate in long-term peer-reviewed studies with Campbell Timberland Management and SPI to monitor the effectiveness of current timber harvesting practices on protecting water quality. Ross Johnson stated that funding from CDF should be available this fiscal year for these projects. Cajun James and Stephen Levesque volunteered to complete a search for possible sites on their respective ownerships to see if each could locate potential watersheds for these case studies. Pete Cafferata stated that a meeting to discuss a scientific framework for studying the effects of harvesting activities on water quality was scheduled for September 18<sup>th</sup> at the USFS’s Redwood Sciences Laboratory in Arcata. **Pete Cafferata will schedule a MSG subcommittee meeting with all the interested agencies and groups (BOF, CDF, CGS, NCRWQCB, DFG, CDPR, NMFS, CFA, UCCE, SWRCB, U.S. EPA, EPIC, HWC/SSRC, and timber industry representatives) to discuss the “straw man” proposal developed to date and possible watersheds for implementing the case studies when Cajun and Stephen have made progress in selecting possible study basins.**

Pete Cafferata provided a brief update on the 2002 Hillslope Monitoring Program field work. ECORP Consulting, Inc., CDF’s contractor for the 2002 field work, reported that they have completed 23 THPs and NTMPs, out of a total of 50 projects. Registered Geologist (RG) Kaylea White was unable to finish the project and RG Martin Trso was trained on August 12<sup>th</sup> and 13<sup>th</sup>. Due to previous commitments by the new RG, field work is on hold until September 25<sup>th</sup>. ECORP hopes to finish by the contract by the end of October.

The next agenda item was a Power Point presentation by Pete Cafferata on preliminary development of the updated Hillslope Monitoring Program (HMP) Draft BOF Report for THPs and NTMPs evaluated from 1996 through 2001. Basic queries have been run and summary information is now available, but a draft report has yet to be written. Pete provided a brief introduction to the program, as well as information on where the 300 projects were located. To date, 568 road segments (104 mi), 480 skid trail segments (66 mi), 569 landings, 491 watercourse crossings, 683 WLPZs (96.8 mi), and 50 large erosion events have been evaluated. Updated rule implementation and effectiveness data was provided for each of these subject areas. Forest Practice Rule implementation ratings were generally similar to those reported in the June 1999 report to the BOF. Erosion features noted on roads and skid trails (rills, gullies, mass wasting events, cutbank and side slope sloughing) decreased in frequency in the period from 1999 to 2001 when compared to 1996 to

1998, possibly due to reduced storm size and intensities after 1997. Watercourse crossing problems remain frequent, with nearly half the crossings evaluated having at least one problem recorded. At least 80% of the crossings were existing crossings in place prior to the current THP. WLPZ total canopy levels remain high in all Forest Practice Districts. Only about 10% of the landings were assigned problem points and sediment delivery to watercourses from these features was very infrequent. For all subject areas, where problems were noted they were almost always related to what was judged to be poor implementation of the Rules. Overall implementation ratings for entire road transects, skid trail transects, landing features, crossing features, and WLPZ/ELZ transects were: 93%, 95%, 93%, 86%, and 98%, respectively. For all the rules rated, 94.5% were rated to be in conformance with stated requirements. Clearly, watercourse crossings stand out as the largest problem area. Data collected to date support the conclusion that individual practices required by the Forest Practice Rules are generally effective in preventing hillslope erosion features when properly implemented.

Considerable discussion took place during the presentation, with suggestions for additional queries to improve the final report that is written. **It was agreed that a Power Point presentation on the Hillslope Monitoring Program will be provided to the BOF at their November meeting and the final report will be made available in January.**

Clay Brandow provided a Power Point presentation on Modified Completion Report (MCR) hillslope monitoring data collected by CDF Forest Practice Inspectors to date. He provided a summary of the program and suggested that MCR forms and instructions can be found online at [http://www.fire.ca.gov/bof/board/msg\\_archive.html](http://www.fire.ca.gov/bof/board/msg_archive.html). Data is collected for a randomly located road segment (1000 ft), 2 watercourse crossings, and one 200 ft WLPZ segment (Class I and II). Sample size is a random selection of 12.5% of THPs undergoing Work Completion Report field inspections. To date, 132 THPs have been sampled, with 101 having a Class I or II WLPZ. As reported at the last MSG meeting, Class I WLPZ total canopy has averaged 83% in the Coast District and 68% in the inland (Northern and Southern) districts. Class II total canopy has been similar, with 83% and 69% in the Coast and inland districts, respectively. Canopy measurements made for the MCR work have agreed remarkably well with those made in the Hillslope Monitoring Program. For the road segments to date, 15% of evaluated stretches have had at least one departure from the FPRs. Most of the departures have related to waterbreak spacing, waterbreak discharge into cover, and waterbreak construction. Additionally, 145 crossings have been sampled, and contrary to HMP results, FPR departure rates have been found to be low. This may be due to: 1) fewer overwintering periods, 2) differences in forms, rating categories, reviewer opinions, and 3) requirement for major problems to be fixed prior to plan completion report approval. Clay emphasized that a quarterly audit is now being completed routinely, using information from the Forest Practice database, since collecting a complete random sample continues to be a concern. This audit generates a list of MCRs missing by THP number, and the list is shared with CDF Resource Managers at regularly scheduled Forest Management Committee (FMC) meetings. Overall, cooperation in completing MCR monitoring is improving. **Clay will provide the MSG with updated MCR information as it becomes available.**

Following Clay's presentation, there was a general discussion about hillslope monitoring. Jerry Ahlstrom asked how long do we need to continue hillslope monitoring efforts. Since crossings and road drainage structures have been identified as having numerous problems in the HMP, how do we resolve the problem—with rule changes? Installation procedure changes? Jerry stressed that we need to take the next step and do something with the information collected so far. Similarly, Richard Gienger expressed that we need to do more to address problem areas such as crossings, and added that one day crossing removal workshops based on the Mattole River efforts would be valuable. The group clearly felt that education, training, and general information dissemination are valuable approaches for addressing known problem areas. This is particularly true for proper

abandonment of existing crossings—where it is easy to make mistakes. Tharon O'Dell stated that he was impressed with some of the similarities in the HMP and MCR datasets, but stressed that we really have not been doing this work for a very long time and continued hillslope monitoring efforts are merited. Pete Ribar stated that CLFA is planning to have a workshop on watercourse crossings in the Spring of 2003 based on a request/input from the MSG. Mark Rentz stated that a link to Associated California Loggers would be valuable as well, since the logging work force is constantly changing due to current economic conditions and re-education is critical. **In concluding this topic, Tharon O'Dell asked that we have as an agenda item for the next MSG meeting the topic of “where do we go from here?” regarding hillslope monitoring.**

The agenda called for a topic addressing the status of a cumulative watershed effects project based on the recommendations in the UC Report titled “A Scientific Basis for the Prediction of Cumulative Watershed Effects.(i.e., the Dunne Report). **Dr. Bill Stewart, CDF-FRAP, asked Pete Cafferata to inform the group that the contract with CDF was cancelled due to State Water Resources Control Board funding reductions.**

Under the New and unfinished business agenda item, Pete Cafferata mentioned that no additional work had been undertaken on the Watershed Data Catalog (formerly known as the Reference Watershed Catalog). **While it had been suggested that a fall meeting would be valuable, due to time constraints this will meeting will be moved forward into 2003.** Pete also mentioned that he has submitted Contract and Project Proposal sheets for remeasurement of stations established for 12 tributaries of the Garcia River watershed. Baseline measurements were made in 1998 and 1999 for parameters such as temperature, gravel permeability, LWD, fish surveys, channel cross sections, long profiles, etc. Tom Schott, District Conservationist for the NRCS and lead staff for the Mendocino County RCD, has informed CDF that approximately \$100,000 from a NCRWQCB 319(h) grant contract is available to the RCD. To receive the full amount, the RCD will need a \$68,000 match in funds—this can be hard or soft money. Much of this money (\$40,000) could come from CDF's proposed second contract with the RCD. Continued monitoring work in the Garcia would demonstrate BOF/CDF/MSG interest/involvement in this long-term monitoring project.

**The next MSG meeting was scheduled for November 13, 2002, at 10:00 a.m. at the Howard Forest Training Center.**